UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
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AIR AND RADIATION
DIVISION

SEP 11 2019

Ms. Maia Bellon
Director
Washington Department of Ecology
P.O. Box 47600
Olympia, Washington 98504

Dear Ms. Bellon:

This letter is in response to the Washington Department of Ecology submission sent March 20, 2019, regarding the elevated 24-hour PM_{10} concentrations measured at the monitoring site in Kennewick, Washington (KENMETA, AQS site number 53-005-0002, POC3) on September 5-7, 2017. Ecology also submitted information regarding the monitoring site in Yakima, Washington (YAK4S, AQS site number 53-077-0009, POC3) for the same time period, which we plan to respond to in a separate letter. Ecology has requested that the U.S. Environmental Protection Agency concur that these elevated PM_{10} concentrations on these three days in September 2017 at the Kennewick monitoring station were caused by exceptional events due to wildfire emissions in Washington, Northern California, Oregon, Idaho, and Montana.

In 2016, the EPA revised the Exceptional Events Rule found in 40 CFR 50.14 and 51.930. See "Treatment of Data Influenced by Exceptional Events" rule (81 FR 68216, October 3, 2016). The 2016 rule revisions at 40 CFR 50.14(a)(1)(i) limit the applicability of the Exceptional Event Rule to exceedances or violations of the National Ambient Air Quality Standards that have relevance to specific regulatory determinations by the EPA, or otherwise as approved by the EPA administrator on a case-by-case basis. After careful consideration of the information provided, we concur, based on the weight of evidence, that Ecology has made the demonstrations referred to in 40 CFR 50.14(a)(2) and (b)(1) for a limited subset of days included in Ecology's request. Ecology has met the schedule and procedural requirements in 40 CFR 50.14(c) with respect to the same information; however, only a portion of the days currently meet the regulatory significance requirement. The EPA has reviewed the documentation provided by Ecology to demonstrate that the elevated PM_{10} concentrations recorded at the Kennewick monitoring station on September 5 and 6, 2017 (but not September 7, 2017), meet the criteria for an exceptional event in the Exceptional Event Rule. The basis for our concurrence is set forth in the enclosed technical support document. My staff has entered or will shortly enter a "concurrence flag" for this data into the EPA's Air Quality System data repository. The EPA will retain the Ecology's demonstration for September 7, 2017, for future consideration should this data become significant for a future regulatory action.

The EPA's concurrence is a preliminary step in the regulatory process for actions that may rely on the dataset containing the event-influenced data and does not constitute final agency action. When the EPA takes a regulatory action that is affected by exclusion of the PM_{10} data for the exceedances that occurred at the Kennewick monitoring station on September 5 and 6, 2017, the EPA intends to publish notice of

its proposed action in the Federal Register. The EPA's concurrence letter and accompanying technical support document will be included in the record as part of the technical basis for that proposal. When the EPA issues that regulatory action, it will be a final agency action subject to judicial review.

Thank you for Ecology's submission of this exceptional event documentation. If you have any questions or wish to discuss this matter further, please contact me or have your staff contact Matthew Jentgen, Air Planning Section, Division of Air and Radiation, at (206) 553-0340.

Sincerely,

Krishna Viswanathan
Acting Director

Enclosure

cc: Ms. Kathy Taylor
Ecology

Mr. Jason Alberich
Ecology

Ms. Laurie Hulse-Moyer
Ecology

Mr. Jacob Berkey
Ecology

EPA, Region 10
Technical Support Document

Review of Exceptional Event Request
Kennewick, Washington
PM_{10} NAAQS
Dates Analyzed: September 5-7, 2017

Background

On October 3, 2016, the U.S. Environmental Protection Agency published a final rule, *Treatment of Data Influenced by Exceptional Events*, with an effective date of September 30, 2016, (Exceptional Events Rule or EER at 81 FR 68216). The 2016 Exceptional Events Rule governs the review and handling of certain air quality monitoring data for which the normal planning and regulatory processes are not appropriate and revises the rule initially adopted by the EPA on March 22, 2007, (72 FR 13560). Under the Exceptional Events Rule, the EPA may exclude data from use in determinations of National Ambient Air Quality Standard (NAAQS) exceedances and violations if a state demonstrates that an "exceptional event" caused the exceedances. Before the EPA can exclude data from these regulatory determinations, the state must notify the Administrator of its intent to exclude data by flagging the data in the EPA's Air Quality System database and engaging in the initial notification process. Then, after notice and opportunity for public comment at the state level, the state must submit a demonstration to justify the exclusion. After considering the weight of evidence provided in the demonstration, the EPA decides whether the requirements for concurring on the flag have been met. Final action on the data exclusion does not occur until it is acted upon as part of a final regulatory action subject to public notice and comment.

Washington Department of Ecology Request

Ecology requested concurrence on flagged 24-hour PM_{10} concentrations that occurred over a three-day period at the Kennewick, Washington monitoring station (KENMETA, AQS site number 53-005-0002, POC3) ("Kennewick monitoring station"). The recorded PM_{10} concentrations for which Ecology requests the EPA's concurrence are shown in Table 1.

Table 1. PM_{10} concentrations for which the Ecology requests the EPA's concurrence[1]

Date	PM_{10} Concentration ($\mu g/m^3$) KENMETA, 53-005-0002, POC3
9/5/2017	261
9/6/2017	207
9/7/2017	195

[1] Note: Ecology included in its submittal a data table (Table 1) that had the following values: 292 $\mu g/m^3$ for September 5, 2017; 238 $\mu g/m^3$ for September 6, 2017; and 212 $\mu g/m^3$ for September 7, 2017. These are the same values as the Burbank-Maple St monitor (53-071-0006), which was not the regulatory monitor for the Kennewick/ Wallula Maintenance Area during the 2015-17 time period, indicating Burbank-Maple St monitoring data was included by mistake. The values from the Kennewick monitor are included above.

Ecology flagged the monitored values as due to a wildland fire exceptional event. The agency made the documentation available for public comment for 30 days starting on August 13, 2018.[2] The comment period closed on September 14, 2018, and Ecology received six comments and has included its response to the comments in its submission. Ecology submitted the exceptional event demonstration package to the EPA on March 20, 2019. Ecology requests concurrence from the EPA for the flagged days, based on Ecology's conclusion that the dates at the Kennewick monitoring station have regulatory significance with regard to the PM_{10} 24-hour standard and the criteria for submission of a second 10-year maintenance plan. Ecology identified the dates with current regulatory significance as September 5-7, 2017.

The EPA's Exceptional Event Evaluation

The EPA agrees with the Ecology that the PM_{10} exceedances on September 5 and 6 , 2017, have regulatory significance for purposes of the Kennewick PM_{10} second 10-year maintenance plan. However, after evaluating the criteria in the Exceptional Events Rule, the EPA determined that September 7, 2017, does not have regulatory significance and will not be evaluated as due to a wildfire exceptional event in this action. The 2016 rule revisions at 40 CFR 50.14(a)(1)(i) limit the applicability of the EER to NAAQS exceedances or violations that have relevance to specific regulatory determinations by the EPA or otherwise as approved by the EPA administrator on a case-by-case basis. The September 7, 2017, data does not have regulatory significance at this time because the area attains the PM-10 NAAQS once the September 5 and 6, 2017 data is excluded from consideration.

Table 2. PM_{10} Concentrations that Have Regulatory Significance

Date	PM_{10} Concentration ($\mu g/m^3$) KENMETA, 53-005-0002, POC3
9/5/2017	261
9/6/2017	207

Below is a summary of the requirements of the Exceptional Events Rule and a description of how Ecology met each requirement. All references to page numbers, tables, and figures relate to Ecology's March 20, 2019 submission.

Procedural requirements

- **The state must notify the EPA of its intent to request exclusion of data as due to an exceptional event by creating an initial event description, flagging the associated data in the EPA's AQS database, and engaging in the Initial Notification of Potential Exceptional Event Process. 40 CFR 50.14(c)(2)(i).**

Ecology flagged and described the September 5 and 6, 2017, 24-hour PM_{10} values as due to a wildland fire exceptional event in the EPA's AQS database. Ecology met the Exceptional Event Initial Notification requirements through multiple EPA -Ecology calls since December 2017 and Ecology's

[2] Note: Ecology included in its submittal the dates of the public comment period as September 25 – October 25, 2017. These were the dates of a public comment period for a previous August 14, 2015, Exceptional Event demonstration. The correct dates for the public comment period are included above.

participation in the EPA, Region 10 Annual Exceptional Events teleconference on May 31, 2018. Thus, Ecology has met the Initial Notification and Flagging requirements for this demonstration.

- **The public had an opportunity to review and comment on the demonstration justifying data exclusion; any public comments received by Ecology were included in the demonstration; and the demonstration addresses those comments disputing or contradicting factual evidence provided in the demonstration. 40 CFR 50.14(c)(3)(v).**

Ecology provided a 30-day public comment period on the documentation for the claimed exceptional event. The public comment period ran from August 13, 2018 to September 14, 2018. Six comments were received that Ecology organized into four different topics. Ecology included the comments and its response to the comments in the March 20, 2019, demonstration, and its submission addressed the comments that disputed or contradicted factual evidence provided in Ecology's demonstration. Thus, Ecology has met the public comment requirements for this demonstration.

Technical Criteria

- **The demonstration includes a narrative conceptual model that describes the event as provided in 40 CFR 50.14(c)(3)(iv)(A).**

Ecology explained that in 2017 there were extensive wildfires occurring throughout Washington, Northern California, Oregon, Idaho, and Montana. Figure 1 displays the daily and 5-day average acres burned in the Western U.S. and Canada from June to September 2017. The actual acres burned in 2017 in these areas are noted in Table 3. The PM_{10} exceedances at the Kennewick monitoring station on September 5 and 6, 2017, correspond with the spike in acres burning during early September 2017. To demonstrate the impact from the wildfires, Ecology compared the average annual anthropogenic $PM_{2.5}$ and PM_{10} county-level emissions (Benton County, Washington) to the emissions per day from the wildfires occuring in the Western U.S. and Canada from September 3-7, 2017. Of note, the $PM_{2.5}$ and PM_{10} emissions in Washington from the September 3-7, 2017, wildfires were larger than the annual $PM_{2.5}$ and PM_{10} emissions inventory in Benton County. Ecology provided numerous media reports on the wildfire and air quality impacts and a copy of Governor Jay Inslee's statewide wildfire emergency announcement, issued on September 2, 2017.

Ecology also included a description of the general weather conditions during the period of September 3-7, 2017. According to weather data Ecology provided from the National Oceanic and Atmospheric Administration, the entire Pacific Northwest was under a strong upper level ridge pattern that began to establish itself on September 3, 2017. The ridge pattern was strongest on September 5 and remained in place through September 7. The high pressure shifted between eastern Oregon and the tri-state (Oregon, Washington, and Idaho) boundary before breaking on September 8 due to a low pressure system that approached the coast of Northern California. This provides evidence that the upper level ridge pattern and high-pressure system contributed to wildfire smoke settling in areas near the monitor's location.

Ecology also included, as Figure 3, data from a vertical wind profiler in Troutdale, Oregon, located at the west end of the Columbia River Gorge (Kennewick is located further east along the Columbia River Gorge). The wind profiler shows the progression of airflows up to 6 km above ground level between September 4-7, 2017. According to Ecology, a low-level jet brought east winds from the morning of September 4 through the afternoon of September 5, which decoupled from the upper level winds. There

was likely a subsidence inversion present during the wildfire event, with mixing heights dropping by September 7, 2017. Low level east winds carried smoke from Idaho and Montana into the region, after which SSW upper level winds transported Oregon and California smoke and forced the smoke down to the surface by the subsidence inversion. Surface winds then slackened and made the smoke from all these sources linger in the area until the ridge began to degrade on September 8, 2017. Ecology concludes that the strong ridge, coupled with dry conditions at the beginning of September, caused rapid fire growth which led to increased smoke production. The smoke, trapped by stagnant conditions, continued to accumulate each day the ridge was in place.

Ecology's submission provides a detailed description of the claimed exceptional event, with multiple wildfires occurring throughout the Western U.S. surrounding Kennewick and the meteorological conditions which allowed for the build-up of PM_{10} from these extensive wildfires. The submitted demonstration satisfies the conceptual model criteria.

- **The event meets the definition of a "wildfire" in 40 CFR 50.1(n). Also, the event satisfies the "unlikely to recur at a particular location or a natural event" criteria in 40 CFR 50.1(k); 40 CFR 50.1(n); 40 CFR 50.1(o); 40 CFR 51.14(c)(iv)(E).**

A "wildfire" is defined in the Exceptional Events Rule as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." "Wildland" is defined as an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered." A "natural event" is described as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role." See 40 CFR 50.1.

Ecology's submission explains that the "natural events" were extensive wildfires that were occurring throughout the Western U.S and Canada. As seen in Figures 8, these large wildfire incidents were occurring in forested areas with minimal human activity and development and, therefore, meet the definition of wildland. Additionally, Ecology evaluated other source category emissions, including prescribed fires, agriculture burning, residential wood combustion, open burning, and vehicle emissions. Ecology notes that there was a burn ban in effect at the time of this event so there were no prescribed fires, agriculture burning, open burning or residential wood combustion sources allowed. Also, windblown dust was not a likely contributor on the event days because of low wind speeds and evidence of high $PM_{2.5}/PM_{10}$ ratios, further explained below. Ecology's submission supports the conclusion that the event meets the definition of a "wildfire" that occurred on "wildland," and meets the definition of a "natural event" in the Exceptional Events Rule.

- **The event satisfies the "clear causal relationship" criteria in 40 CFR 50.1(j); 40 CFR 50.14(c)(3)(iv)(B).**

As part of assessing a clear causal relationship, Ecology provided monitoring data to demonstrate that air quality data was affected at the Kennewick monitoring station on the days in question (Table 1 and 7). Then to demonstrate a clear causal relationship between the wildfire event and the elevated PM-10 concentrations at the monitoring station, Ecology examined meteorology, satellite data, back trajectories, and time series data for the September 5-7, 2017, period and surrounding days.

Ecology observes that the series of true color satellite photos with HYSPLIT back trajectories for Kennewick show the presence and movement of smoke during early September 2017 (Figures 4-7). On September 4, the winds transported smoke mainly from Northern California, Western Oregon and Washington local fires to the Kennewick monitoring station. On September 5, the strong upper level ridge trapped smoke in Washington, and the east wind also transported smoke from Idaho and Montana to Washington. On September 6 and 7, thick smoke covered all three Pacific Northwest states, Washington, Oregon, and Idaho, as well as western Montana. The wind barbs showed no or very light wind that led to low smoke dispersion. The PM_{10} monitor data included in Tables 1 and 7 clearly show that on the event days, the PM_{10} concentrations far exceed the NAAQS, and are elevated on the surrounding days.

Ecology also notes that, generally, 85 percent of particulate matter in smoke from fires is fine particulate matter ($PM_{2.5}$), while the mean $PM_{2.5}/PM_{10}$ ratios outside of exceptional events during the 2015-2017 period was around 50 percent. This correlation was not evident at the Kennewick monitoring station because Ecology asserts that $PM_{2.5}$ is estimated at that station using a non-regulatory correlated nephelometer and the correlation was developed using wintertime data. The correlation did not account for the significantly higher PM2.5 concentrations during the event period. However, PM_{10} concentrations were well-correlated with the estimated $PM_{2.5}$ levels at Kennewick during this event as smoke accumulated in the area, even though the nephelometer likely underestimated $PM_{2.5}$. The Yakima and nearby Spokane monitoring stations use Federal Equivalent Method (FEM) Beta Attenuation Monitors, which did show that the $PM_{2.5}$ concentrations recorded by the FEM monitors at Spokane and Yakima were all around 85 percent of the PM_{10} concentrations during the wildfire event. This supports Ecology's conclusion that the wildfire smoke impacted the air quality monitors in the area.

Based on Ecology's submission, the EPA concludes that there is a clear causal relationship between the wildfires and elevated PM_{10} concentrations recorded at the Kennewick monitoring station on September 5 and 6, 2017.

- **The demonstration includes an analysis comparing the claimed event-influenced concentrations to concentrations at the same monitoring site at other times to support the "clear causal connection" requirement. 40 CFR 50.14(c)(3)(iv)(C).**

Ecology compared the event-influenced concentrations to concentrations from the same monitoring site over the course of multiple years and seasons to support its conclusion that the wildfires affected air quality. For Kennewick, data from 2013-17 (Figure 10) shows that the 24-hour PM_{10} concentrations only exceeded the NAAQS (150 μg/m3) during high wind and wildfire events. A frequency distribution of the daily PM_{10} data at the Kennewick monitoring station during the 2013-17 period (Figure 15) also shows that the exceedances during the September 2017 wildfire event were higher than 99 percent of values during the most recent five years.

Figures 17-18 in Ecology's submission are annual time series plots that provide further evidence that the data during the September 2017 wildfire event are outliers. Figures 18-19 plot diurnal patterns at the Kennewick and Yakima monitors, which showed much greater volatility during the three event days compared to the relatively flat pattern under normal conditions. All of the 2013-17 exceedances at each monitor are described in Table 8. Ecology observes in Figures 12-14 that a nearby PM_{10} regulatory monitor in Spokane, Washington had similar PM_{10} exceedances during the event period, and the PM_{10} concentrations correlated well with $PM_{2.5}$ at all three monitors. Ecology also notes that this 2017 wildfire

event was the first wildfire event that caused PM_{10} exceedances at the Kennewick, Spokane and Yakima PM_{10} monitors at the same time.

- **The event satisfies the "not reasonably controllable and not reasonably preventable" criteria in 40 CFR 50.1(j); 40 CFR 50.14(b)(4), (b)(8), and (c)(3)(iv)(D).**

The Exceptional Event Rule states that "provided the Administrator determines that there is no compelling evidence to the contrary in the record, the Administrator will determine every wildfire occurring predominantly on wildland to have met the requirements identified in (c)(3)(iv)(D) of this section regarding the not reasonably controllable or preventable criterion." (40 CFR 50.14(b)(4)).

Ecology thoroughly documented through the conceptual model that there were extensive wildfires occurring in the Western U.S. and Canada. Ecology also analyzed alternative sources that potentially could have contributed emissions and found that none were contributing significant or elevated emissions during the time of the event. The EPA is not aware of any information to the contrary. Therefore, based on 40 CFR 50.14(b)(4), the EPA determines that these wildfires were not reasonably controllable or preventable.

- **The event satisfies the "mitigation" criteria in 40 CFR 51.930.**

40 CFR 51.930 requires that a state requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the NAAQS. At a minimum, the State must:

1. Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;

2. Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and

3. Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

To protect the public health from exceedances or violations of the NAAQS, Ecology developed a number of methods to provide notification to the public and educate the public concerning actions to reduce exposure during an exceptional event. For Kennewick, Ecology issued Air Quality Alert Messages along with health information and the alert was in effect from September 4 to 11, 2017. The National Weather Service in Pendleton, Oregon relayed the messages. Additionally, Ecology posted public notifications on the Washington Smoke Blog website (http://wasmoke.blogspot.com/), including: smoke forecasts, smoke updates, meteorological conditions, and health information. Ecology also posted daily smoke information on Ecology's Twitter and Facebook pages and joined the effort with the Washington Department of Health and Department of Natural Resources in sending out social media public notifications. Ecology did five radio interviews, put out two YouTube videos and took numerous phone calls from the public. The local air agency, Benton County Air Agency, disseminated information through television interviews, press releases, and other local outreach.

The information in Ecology's submission is sufficient to demonstrate that it has met the mitigation requirements of 40 CFR 51.930. Ecology has not requested concurrence on three wildfire events/seasons

within three years. Therefore, the mitigation plan requirement in 40 CFR 51.930(b) is not applicable at this time.

Conclusion

Based on the documentation submitted by Ecology on March 20, 2019, the EPA concurs with Ecology that the PM_{10} data values listed in Table 3 have regulatory significance and were due to a wildfire exceptional event.

Table 3. 24-hr PM_{10} values at the Kennewick monitoring station flagged by Ecology and concurred on by the EPA as meeting the Exceptional Event Criteria

Date	PM_{10} Concentration ($\mu g/m^3$) KENMETA, 53-005-0002, POC3
9/5/2017	261
9/6/2017	207

The information and analyses presented in Ecology's exceptional event demonstration package provided weight of evidence sufficient for the EPA's concurrence on the flagged data from the Kennewick monitoring station on the dates listed above in Table 3 and as described in this document. Accordingly, the EPA is placing a concurrence indicator in the EPA's AQS database for these dates at this monitor.

The EPA's concurrence is a preliminary step in the regulatory process for actions that may rely on the dataset containing the event-influenced data and does not constitute final agency action. When the EPA takes a regulatory action that is affected by exclusion of the PM_{10} data at the Kennewick monitoring station on September 5 and 6, 2017, the EPA intends to publish notice of its proposed action in the Federal Register. The EPA's concurrence letter and this accompanying technical support document will be included in the record as part of the technical basis for that proposal. When the EPA issues that regulatory action, it will be a final agency action subject to judicial review.